

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 86113471.6

(51) Int. Cl.⁴: **A 23 L 1/18**

(22) Date of filing: 01.10.86

(30) Priority: 01.10.85 US 782753

(43) Date of publication of application:
08.04.87 Bulletin 87/15

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(71) Applicant: **DNA PLANT TECHNOLOGY CORPORATION**
(under the laws of the state of Delaware)
2611 Branch Pike
Cinnaminson, New Jersey(US)

(72) Inventor: **Evans, David Alan**
917 Lincoln Avenue
Palmyra Burlington New Jersey(US)

(72) Inventor: **Lipschutz, Leslie**
8 Belle Lane
Cinnaminson Burlington New Jersey(US)

(74) Representative: **Patentanwälte Grünecker, Kinkeldey,**
Stockmair & Partner
Maximilianstrasse 58
D-8000 München 22(DE)

(54) **Flavor impregnated popcorn.**

(57) The present invention relates to a method for flavoring corn kernels which comprise soaking the kernels in an aqueous solution comprising a flavoring component, for a period of time and at a temperature sufficient to allow the flavoring to impregnate the corn kernels.

5 The present invention relates to a new method of
flavoring popcorn kernels. More particularly, the invention
relates to a method of flavoring popcorn kernels by
impregnation of flavoring, rather than coating the kernels
with flavoring.

10 Popcorn has for some time been a popular snack food
product. In recent years, flavored popcorns, such as those
flavored with salt, sugar, cheese, chocolate, or fruit
flavors have become of particularly popular item. Because of
the current popularity of this flavored popcorn, new ways of
producing a better flavored product are instantly being
sought. A number of different methods are currently being
15 employed for flavoring both popped and unpopped kernels.
Certain techniques require that the flavor be added after the
popping process, i.e., the actual popped corn is simply
coated with a dried flavoring, such as salt or cheese powder.
Techniques of this sort are described in U.S. Pat. Nos.
20 4,171,667; 3,882,255; 3,783,820; 3,647,474; and 3,617,389.
Other methods require that the flavor be added during the
popping process (see, for example, U.S. Pat. Nos. 4,163,006;
4,096,281; 3,973,045; 3,961,091; 3,851,574, and 3,641,916).
As in the process in which flavoring is added after popping,
25 this procedure results in popcorn which is simply
superficially coated with the flavoring. It is also known to
add flavoring to the unpopped kernels prior to popping, as
described in U.S. Pat. No. 3,704,133. In the latter case,
popcorn kernels are treated with a mixture of shortening,
30 water, a lipophilic surfactant and flavoring, with an aim to

1 coating and adhering the flavoring to the surface of the
unpopped kernel.

5 All of the procedures described above produce a
product which at least has a superficial coating of the
desired flavor. The apparent disadvantages of such a product
are clear: the possibilities of uneven coating over the
entire population of kernels is great, with some popped
kernels possibly not even getting coated; also, even if the
kernels do get coated, the flavor is one which does not
10 penetrate the entire popped kernel, leaving one with a less
flavorful product. Although the results achieved by these
processes is far from satisfactory, it has not heretofore
been possible to produce a flavored product which was
uniformly and completely flavored throughout.

15 It has now been unexpectedly discovered that it is
possible to actually impregnate the entire kernel of corn,
prior to popping, thus yielding, upon popping, a popcorn
which is completely and fully flavored. In other words,
rather than coating the surface of either the unpopped or
popped kernel, the flavor is allowed to actually penetrate
20 the seed coat of the unpopped kernel, so that the kernel is
flavored both internally and externally. This produces a
more fully and uniformly flavored, and thus more desirable
final product. In addition to yielding a more flavorful
product, however, the process is extremely simple and
25 inexpensive to employ.

The present invention relates to a method for
flavoring corn kernels which comprises soaking the kernels in
an aqueous solution comprising a flavoring component, for a
period of time and at a temperature sufficient to allow the
30 flavoring to impregnate the corn kernel.

1 The present method for improved flavoring of corn
kernels to be popped is based on the observation that soaking
unpopped kernels in a flavored solution for a relatively
5 prolonged period of time allows actual penetration of the
flavoring through the hull of the kernel, and into the
interior of the kernel itself. In general, the kernels are
submerged in an aqueous solution containing the desired
flavor for a period of from about 60 minutes to about 24
hours. As is known, excess water can prevent satisfactory
10 popping, so it is important that the kernels not be left for
a period of longer than one day. The preferred length of
time is between about 60 minutes to 3 hours, with the most
preferred soaking time being about 90-120 minutes.

 To enhance flavor penetration the aqueous solution
15 should be maintained at least above ambient temperature, and
preferably in the range of about 100-170°F. Temperatures of
between 130-160°F are particularly favored, during the period
of soaking. The concentration of the flavoring to be added
depends, of course, on the nature of the flavoring, the
20 concentration of the flavoring used, and the intensity of the
flavor desired in the final product. It is well within the
skill of the experienced worker to vary the amount of
flavoring added to the soaking water in order to achieve the
desired result.

25 The present method is particularly well adapted for
use with salt-based flavorings. Among the preferred
flavorings are, for example, ordinary table salt (sodium
chloride), garlic salt, onion salt, celery salt or butter
flavored salt, all of which are readily commercially
30 available. In order to obtain a satisfactory intensity of
flavor in the final product, it is preferred that the

1 salt-based flavoring be employed in an amount of at least
16g/100ml of water for soaking. Particularly good results
are achieved when the flavoring is present in an amount of
from about 16-32g/100ml of water. These proportions, of
5 course, are intended only as guidelines and may be readily
varied depending on the individual taste which is desired in
the final product.

Although the above types of flavorings are
particularly preferred, the present method is not limited to
10 use with salt-based flavorings. Other commonly used flavors,
such as sugar, chocolate, cheese, fruit, maple, cinnamon, and
the like may also be readily adapted for use in this process.
These flavorings may be added to solution in powdered form,
such as extracts or liqueurs. As previously noted, the
15 concentrations may readily be varied in order to achieve the
desired flavor intensity of the final product, and based on
the initial concentration of the starting material. It will
be readily apparent to the skilled artisan how to determine
the preferred concentrations for the flavor of choice.

20 The above procedure describes the process steps
required to achieve the desired, flavor impregnation of the
unpopped kernels. Following the soaking process, however, a
number of additional steps are preferably employed in order
to best prepare the impregnated kernel for popping.
25 Following the soaking of the kernels in the warmed flavor
solution, the kernels and solution should be chilled in an
ice waterbath to bring the temperature down to about 60°C.
This usually requires a chilling period of about 30 minutes
or so. At this point, the kernels are drained of the
30 flavoring solution, and rinsed with water to remove any
remaining flavoring solution. The kernels are then dried,
for a period of about 1-24 hours; drying may be done in any
suitable manner, but drying in a warm oven, for a

1 period of 1-3 hours, at a temperature of between 140-180°F
has proven particularly favorable. At this point the kernels
are ready for popping by any of the traditional methods known
for popping corn.

5 The present method may be further understood by
reference to the following non-limiting examples:

10

15

20

25

30

35

EXAMPLE 1

1 Unpopped kernels were soaked in an aqueous solution
containing 32mg NaCl/100ml of water, at a temperature of
about 150°F, on a warm hot plate for a period of about 90
5 minutes. Following the soaking treatment, the
kernel-containing solution was then chilled, in an ice bath,
for about 30 minutes. The final temperature was about 60°F.

The kernels were then drained, and a portion
removed prior to rinsing. The remaining portion was rinsed
10 off with water and both portions were placed on paper
towelings and dried in a forced draft oven at a temperature of
80-90°C for a period of about 60 minutes.

The flavor impregnated kernels were then compared
with a population of kernels which were treated i.e., soaked
15 in water without salt, and each population was then tested
for a comparison of the amount of sodium which had penetrated
the treated kernels, relative to the amount present in
untreated kernels. Both unpopped and popped kernels were
tested for their salt content. Popped kernels were popped in
20 a WearEver Hotair popcorn popper. The results of the
impregnation procedure are demonstrated in Table 1.

25

30

35

1

TABLE I

Results of sodium ion (Na^+) analysis
of untreated and salt impregnated popcorn

5	<u>Variable</u>	<u>Control</u>	<u>Impregnated</u>
		(mg/100g)	(mg/100g)
	1. unpopped		
	a) whole kernel	8.73	557
	b) seed coat	39.50	2263
10	c) endosperm	1.41	98.3
	2. Popped		
	a) whole kernel	3.52	772
	b) seed coat	7.05	3723
15	c) endosperm	2.82	152

Note: unrinsed, impregnated kernels contained 914 mg/100g of Na^+ .

20

25

30

35

EXAMPLE 2

1

The treated and untreated kernels were also compared for their relative popping qualities. Table 2 shows the results of these comparative tests. The results show that there is substantially no difference in the quality of the popped corn resulting from the impregnation treatment when compared with the untreated popped kernels. This adequately demonstrates that the impregnation process has no adverse effects on the final product.

5

10

15

20

25

30

35

TABLE II

Evaluation of popping of impregnated
popcorn v. unimpregnated popcorn

	No. of kernels/10g popped	Vol/kernel (cc)	Expansion rate (cc/g)	% duds
Control	84.2	3.6	29.7	2.9
Impregnated	80.5	4.2	38.6	6.9

1 WHAT IS CLAIMED IS:

1. A method for flavoring corn kernels which comprises soaking the kernels in an aqueous solution comprising a flavoring component, for a period of time and at temperature sufficient to allow the flavoring to impregnate the corn kernels.

2. The method of Claim 1 wherein the kernels are soaked for about 60 minutes to about 24 hours.

3. The method of Claim 1 or 2 wherein the kernels are soaked at a temperature of about 100-170°F.

4. The method of any of the Claims 1-3 wherein the kernels are soaked at a temperature of about 130-160°F.

5. The method of any of the Claims 1-4 wherein the flavoring is salt-based.

6. The method of any of the Claims 1-5 wherein the flavoring is selected from the group consisting of sodium chloride, garlic salt, celery salt and onion salt.

7. The method of any of the Claims 1-6 wherein the flavoring is present in an amount of at least 16g/100ml of water.

8. The method of any of the Claims 1-7 wherein the flavoring is present in an amount of between about 16g - 32g/100ml of water.

9. The method of any of the Claims 1-8 which further comprises chilling the soaked kernels;

rinsing the soaked kernels; and

drying the kernels prior to popping.

10. Corn kernels impregnated by the method of any of the Claims 1-9.

30

35